DCCUMENT RESUME

ED 035 944 24 CG 005 008

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TITLE PERSONALITY CORRELATES OF ACADEMIC ACHIEVEMENT AND LABORATORY LEARNING OF ELEMENTARY SCHOOL PUPILS. FINAL REPORT.
INSTITUTION KANSAS UNIV., KANSAS CITY. MEDICAL CENTER.
SPONS AGENCY OFFICE OF EDUCATION (DHEW), WASHINGTON, D.C. BUREAU OF RESEARCH.
BUREAU NO BR-8-F-126
PUB DATE AUG 69
GRANT OEG-6-9-008126-0050(057)
NOTE 84P.

EDRS PRICE EDRS PRICE MF-$0.50 HC-$4.30
DESCRIPTORS *ACADEMIC ACHIEVEMENT, ACHIEVEMENT TESTS, *CORRELATION, *ELEMENTARY SCHOOL STUDENTS, *INDIVIDUAL CHARACTERISTICS, INTELLIGENCE, INTELLIGENCE QUOTIENT, INTELLIGENCE TESTS, *LEARNING, LEARNING CHARACTERISTICS, PERSONALITY TESTS, SOCIOECONOMIC STATUS

ABSTRACT

THIS PAPER REPORTS THREE STUDIES DESIGNED TO DETERMINE IF SIGNIFICANT INCREASES COULD BE MADE IN THE PREDICTION OF ELEMENTARY SCHOOL PUPILS' ACADEMIC ACHIEVEMENT BY ADDING PERSONALITY MEASURES TO INTELLECTUAL MEASURES AFTER MENTAL AGE AND INTELLIGENT QUOTIENT LEVELING. A FOURTH STUDY EXAMINED THE UTILITY OF LEVELING PUPILS ON SOCICECONCMIC FACTORS. THE PERSONALITY VARIABLES WERE LCCUS OF CONTROL (LC), EVALUATIVE STYLE (ES), AND INCENTIVE ORIENTATION (IO). THE SUBJECTS CONSISTED OF PUPILS FROM GRADES THREE TO SIX IN NINE ELEMENTARY SCHOOLS. IN STUDY I LEVELING PROCEDURES REVEALED PRACTICALLY SIGNIFICANT CORRELATIONS BETWEEN ACHIEVEMENT AND BOTH LC AND IO FOR PUPILS OF BELOW AVERAGE AND VERY HIGH INTELLIGENCE, RESPECTIVELY, BUT STUDY II, CONDUCTED IN DIFFERENT SCHOOLS, FAILED TO REPEAT THESE RELATIONSHIPS. STUDY III INDICATED THAT DIFFERENT SCHOOLS WERE NOT A RELIABLE DETERMINANT OF THE RELATIONSHIP BETWEEN PERSONALITY AND ACHIEVEMENT. STUDY IV SUGGESTED THAT SOCIOECONOMIC LEVELING EFFECTS THE RELATIONSHIP BETWEEN THESE TWO VARIABLES. THE SECOND PART OF THE INVESTIGATION EVALUATED THE EFFECTS OF LC AND ES UPON INCIDENTIAL AND INTENTICNAL LEARNING. IT WAS FOUND THAT INTERNAL LC CHILDREN RESPONDED WITH GREATER EFFORT DURING LEARNING THAN EXTERNAL LC PUPILS BUT THAT ES WAS AN INCONSEQUENTIAL CORRELATE OF LEARNING. (AUTHOR/RSM)

ED035944

FINAL REPORT

Project No. 8-F-126

Grant No. OEG-6-9-008126-0050(057)

# PERSONALITY CORRELATES OF ACADEMIC ACHIEVEMENT AND LABORATORY LEARNING OF ELEMENTARY SCHOOL PUPILS

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Kansas City, Kansas

August, 1969

The research reported herein was performed pursuant to a grant with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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CONTENTS


| | Page |
|---|---|
| List of Tables | ii |
| Preface | iii |
| Personality Correlates of Academic Achievement | 1 |
| Methods | 5 |
| Subjects | 5 |
| Intelligence and Achievement Measures | 12 |
| Procedure | 16 |
| Results and Discussion | 16 |
| Independence of Predictor Variables | 16 |
| Study I | 18 |
| Study II | 22 |
| Study III | 24 |
| Study I, II, and III Combined | 29 |
| Study IV | 35 |
| Concluding Discussion | 38 |
| Appendix A: Personality and Learning. | |



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LIST of TABLES


| | | Page |
|---|---|---|
| Table 1 | Total Enrollment, Sample Size, and Selected Socioeconomic Indices for Each School in the Four Studies | 6 |
| Table 2 | Descriptive Characteristics of Twelve Subgroups of Subjects in Study I | 8 |
| Table 3 | Descriptive Characteristics of Nine Subgroups of Subjects in Study II | 9 |
| Table 4 | Descriptive Characteristics of Twelve Subgroups of Subjects in Study III | 10 |
| Table 5 | Descriptive Characteristics of Subjects in Study V (n=568) | 11 |
| Table 6 | Intercorrelations of the Predictor Variables in Each of the Four Studies | 15 |
| Table 7 | Summary of Multiple Regression Analysis for All Subjects in Study I (n=407) | 17 |
| Table 8 | Unique Variance for Each of the Five Predictors in Each of the Twelve Subgroups of Study I[a] | 19 |
| Table 9 | Summary of Multiple Regression Analysis for All Subjects in Study II (n=293) | 21 |
| Table 10 | Unique Variance for Each of the Five Predictors in Each of the Nine Subgroups of Study II[a] | 23 |
| Table 11 | Summary of Multiple Regression Analysis for All Subjects from Orthogonal Partition of Experiment III (n=981) | 26 |
| Table 12 | Unique Variance for Each of the Five Predictors in Each of the Twelve Orthogonal Subgroups of Study III[a] | 28 |
| Table 13 | Summary of Multiple Regression Analysis for All Subjects from Studies I, II, and III (n=1989) | 30 |
| Table 14 | Summary of Multiple Regression Analysis for All Subjects from Study IV (n=568) | 33 |
| Table 15 | Partial Correlations Between Each Personality Variable and Achievement Studies, I, II and III and Study IV | 34 |
| Table 16 | Summary of Multiple Regression Analysis for All Subjects in Study I (n=351) Using IO-item Measure of Incentive Orientation | 36 |

## PREFACE

This final report has two major sections. The first section deals with the relationship of three personality variables to academic achievement. The work reported in this first section was all proposed in the application to the Office of Education that resulted in the grant for which this final report is being prepared. The second major portion of this report (Appendix A) deals with the relationship of the same three personality variables to learning in laboratory learning tasks. These experiments were not included in the original application. They are reported here because they supplement the results of the investigations concerning academic achievement. The personality testing that was required for the achievement research formed the basis for subject selection for the experimental research.

Taken together, these two lines of investigation form a two-pronged research strategy. The first phase of the strategy involves isolating personality variables that are significantly related to academic achievement. This phase insures that the research of the second phase, though highly controlled and experimental, will be relevant to classroom learning. The purpose of the second phase is to determine experimentally the functional significance of the personality variables that the first phase shows are related to academic achievement. The purpose of a functional understanding is that it can guide efforts to tailor classroom procedures to the needs of children with different personality characteristics.

# Personality Correlates of Academic Achievement Among Elementary School Students[1]

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For over fifty years psychologists and educators have worked to refine intelligence tests so that they are now among the most sophisticated psychoeducational tests available. Still, they account for only half or less of the variance in academic achievement. More than half the variation in achievement remains to be explained. Many investigators have sought evidence that personality characteristics account for some or all of this remaining variance and they have found statistically reliable relationships between particular personality variables and academic achievement (Lavin, 1965). But these relationships have not been large enough to have value for the public schools. This may be due to methodological limitations of the previous investigations. The possibility remains that different investigative strategies will reveal sizable relationships between personality and the large portion of variation in achievement that cannot be accounted for by individual differences in intelligence.

Practically all attempts to relate personality to achievement have used college students as subjects. College students average higher and distribute themselves across a narrower range of measured intelligence than do elementary and secondary school pupils. College students may also differ from or vary less than students from lower educational levels

in achievement-relevant personality characteristics. Such intellectual and personality differences might make personality more predictive of elementary school pupils' achievement than it is of college students' achievement. College instructional techniques and curricula organization also seem to differ from those of pre-college educational programs, and for this reason personality may not predict as well at the college level as at the lower levels. These possibilities do not apply to those few investigations that have examined the relations of personality to achievement among high school students, but they do suggest the potential value of maximizing observed variation in personality and intelligence by using elementary school pupils as subjects.

Previous investigations may also have failed to find relationships between personality and achievement because they used unreliable measures of personality (Lavin, 1965). For example, several studies (Haber, 1957; Mitchell, 1961; Parrish & Rethlingshafer, 1954; Walter, 1957) failed to find significant relationships between school grades and achievement motivation. These studies used the Thematic Apperception Test (TAT) measure of need achievement. At least one study (Krumboltz & Farquhar, 1957) found the TAT measure to have a reliability of only .25. More reliable instruments have a greater opportunity of entering into reliable correlations. The reliability of personality tests generally increases when their scoring systems are made more objective, so the use of more objectively-scored scales seems desirable. This also has the great practical value of making it more possible for school systems actually

to use personality tests that are found to predict achievement. Wide-scale testing with subjectively-scored tests is prohibitively expensive.

Perhaps previous investigations in this field also have been limited by their use of statistics that assume linear relationships and by combining their Ss into single heterogeneous groups rather than differentiating between them on such variables as intelligence. In effect, investigators have assumed that a personality trait such as achievement motivation has the same effect upon students who differ greatly with respect to such factors as intelligence and age. Consider intelligence: the prevailing strategy ignores the possibility that the personality variable under investigation may be negatively related to achievement in the low IQ range, unrelated in the average IQ range, and yet have a potent influence on the achievement of students in the high IQ range. Given such a curvilinear interaction with intelligence, a linear correlation conducted on data from students who range across the entire IQ continuum would find no or only a weak relationship between personality and achievement. Haywood (1968a, 1968b ) recently reported data that highlights the importance of such considerations.

Haywood administered a motivational orientation personality test to approximately 400 ten-year old children on whom he had intelligence and achievement test data from each of their earlier school years. These subjects had been selected on the basis of IQ from a population of 5,000 ten year olds. When he performed a multiple regression analysis to predict previous achievement from previous measures of intelligence and his

personality measure, he found that the personality measure added insignificantly to the predictive equation.[2] However, when he leveled his population into homogeneous and distinctly different intellectual levels and compared children within these levels who were from the extremes of his personality score continuum, he found a large and highly reliable difference in achievement at the lower IQ lever, a moderate but still reliable difference at the average IQ level, and a small, unreliable achievement difference for children in the superior range (Haywood, 1968b). Although Haywood's work establishes the theoretical importance of personality factors in children's achievement, the generality and practical utility of his findings are limited by: (1) the retrospective nature of his data; (2) the loss of the majority of his population in the course of leveling on IQ; and (3) the selection of children from the very extremes of his personality continuum. Nevertheless, his findings highlight the potential of leveling students on such factors as IQ and MA before seeking correlations between personality and achievement.

This paper reports three investigations designed to determine whether three different personality variables contribute, independently of intelligence, to the academic achievement of elementary school pupils. Three personality variables, rather than one, were studied in order to take advantage of the possibility that some personality variables are important for certain MA and IQ levels, where as different variables predict at other MA and IQ levels. The investigations examined particularly intensively the possibility that leveling on MA and IQ prior to performing multivariate analyses will reveal relationships between personality and achievement that do not emerge when data from children of all MA and IQ levels are analyzed together. A fourth study

examined the utility of leveling pupils on socioeconomic factors before relating personality to achievement.

The three personality measures that were used as predictors were selected because they seemed relevant to achievement and because they could be assessed with objective measures. The personality variables were Locus of Control (LC), Evaluative Style (ES) and Incentive Orientation (IO). LC refers to the extent to which a child feels control over and accepts responsibility for his behavior. ES refers to the extent to which children decide for themselves how well they are doing rather than relying upon the evaluations of others to determine the adequacy of their behavior. IO refers to the extent to which children prefer intrinsic rewards such as learning something new and making something beautiful over extrinsic rewards such as earning money and being comfortable.

## METHODS

### Subjects

The Ss for the four investigations were drawn from nine different elementary schools: two for Study I, one for Study II, four for Study III and two for Study IV. In eight of the schools tests were administered to all children from grades 3 through 6 who were present on the testing days. In one of the schools in Study I only fifth and sixth graders who were present were tested. Table I shows the number of children enrolled in the classes tested for each of the four investigations and the number in each study for whom complete and usable personality, intelligence and achievement test scores were obtained. Complete

Table 1

Total Enrollment, Sample Size, and Selected Socioeconomic Indices for Each School in the Four Studies

| Study | School | Total Students Enrolled | Number Students Used | Percent Students Used | Median School Years | Median Family Income[a] |
|---|---|---|---|---|---|---|
| I | 1 | 350 | 287[b] | 82 | 12.7 | $ 8617 |
| | 2 | 74 | 64 | 86 | 12.4 | 7396 |
| | combined | 424 | 351[b] | 83 | 12.6 | 8394 |
| II | 1 | 351 | 293 | 83 | 12.6 | 8478 |
| III | 1 | 550 | 379 | 69 | 12.7 | 7478 |
| | 2 | 310 | 259 | 84 | 12.8 | 8444 |
| | 3 | 414 | 337 | 81 | 12.7 | 7478 |
| | 4 | 430 | 370 | 86 | 12.9 | 8930 |
| | combined | 1704 | 1345 | 79 | 12.8 | 8063 |
| IV | 1 | 323 | 281 | 87 | 11.0 | 6045 |
| | 2 | 373 | 287 | 77 | 9.3 | 4190 |
| | combined | 696 | 568 | 82 | 10.1 | 5108 |

[a]Since school attendance areas do not correspond exactly with census tracts, the census tract data was weighted by geographical representation in the attendance areas to obtain a single value.

[b]This figure does not include 56 second graders who were also tested at School 1. See footnote 3.

data were obtained from over 80% of the 3,175 potential subjects. Practically all of the less than 20% attrition was due to absence from the classroom on one or more of the testing days. The remaining very small loss of subjects resulted from gross test-taking errors that were observed either during testing, (e.g., sleeping or obvious and persistent inattention to the testing procedure) or at the time of scoring the test (e.g., all personality test questions answered with either "yesses" or "noes" or perfect alternation of "yesses" and "noes").

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Insert Table 1 about here

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Table 1 also shows the median family income and the median educational attainment of all persons 25 years of age and older residing in the attendance areas served by each of the nine schools from which Ss were drawn. These data were obtained from the U. S. Bureau of Census (1960), and they indicate that the socioeconomic level of the schools sampled was quite comparable for Studies I, II and III. The two schools in Study IV were selected because they seemed to serve lower socioeconomic level areas, and Table 1 shows that they do. For each of the four studies Ss were divided into subgroups by leveling them on MA and IQ. The 407 students who served as Ss in Study I were leveled on both MA and IQ by first ranking them on IQ and dividing them as nearly as possible into quartiles.[3] Table 2 shows the IQ ranges which define each of the IQ levels. Each of these four IQ levels was then divided into four MA levels by ranking the Ss in each IQ level accord-

Table 2

Descriptive Characteristics of Twelve Subgroups of Subjects in Study I

| IQ Range | Variable | Low MA[a] $\bar{M}$ | Low MA SD | Medium MA $\bar{M}$ | Medium MA SD | High MA $\bar{M}$ | High MA SD |
|---|---|---|---|---|---|---|---|
| | | (n=34) | | (n=34) | | (n=35) | |
| 70-103 | MA | 103.91 | 8.69 | 122.76 | 3.77 | 140.14 | 7.63 |
| | IQ | 92.09 | 8.88 | 93.71 | 7.67 | 98.26 | 4.30 |
| | LC | 10.35 | 3.93 | 12.15 | 3.73 | 13.37 | 3.34 |
| | ES | 10.79 | 2.97 | 11.53 | 2.39 | 13.17 | 3.02 |
| | IO | 12.21 | 5.54 | 14.24 | 5.88 | 16.86 | 6.08 |
| | | (n=32) | | (n=32) | | (n=31) | |
| 104-111 | MA | 107.47 | 8.41 | 131.63 | 7.26 | 151.71 | 7.11 |
| | IQ | 107.84 | 2.19 | 108.00 | 2.24 | 108.23 | 2.49 |
| | LC | 11.59 | 2.86 | 13.00 | 2.20 | 14.87 | 3.01 |
| | ES | 11.34 | 3.06 | 12.41 | 3.28 | 13.16 | 2.65 |
| | IO | 13.79 | 5.95 | 14.78 | 6.59 | 17.55 | 5.35 |
| | | (n=32) | | (n=36) | | (n=36) | |
| 112-121 | MA | 109.69 | 10.35 | 139.92 | 9.60 | 166.39 | 11.11 |
| | IQ | 115.66 | 3.09 | 115.69 | 3.09 | 116.64 | 2.88 |
| | LC | 10.81 | 2.96 | 13.22 | 3.59 | 14.25 | 3.74 |
| | ES | 11.62 | 3.33 | 11.22 | 2.84 | 12.75 | 3.30 |
| | IO | 11.75 | 4.77 | 17.03 | 6.40 | 18.47 | 5.60 |
| | | (n=33) | | (n=36) | | (n=36) | |
| 122-140 | MA | 122.06 | 11.41 | 151.44 | 12.18 | 198.17 | 29.95 |
| | IQ | 127.21 | 4.63 | 127.34 | 5.46 | 129.87 | 5.94 |
| | LC | 11.52 | 2.69 | 13.50 | 4.20 | 15.53 | 3.27 |
| | ES | 11.48 | 3.72 | 12.16 | 2.77 | 13.53 | 3.31 |
| | IO | 13.76 | 6.32 | 18.03 | 7.00 | 18.70 | 6.43 |

[a]These data include 56 second graders not listed in Table 1. See footnote 3.

[b]MA in months

Table 3

Descriptive Characteristics of Nine Subgroups of Subjects in Study II

| IQ Range | Variable | Low MA[a] $\bar{M}$ | Low MA SD | Medium MA $\bar{M}$ | Medium MA SD | High MA $\bar{M}$ | High MA SD |
|---|---|---|---|---|---|---|---|
| | | (n=30) | | (n=30) | | (n=32) | |
| 74-107 | MA | 109.43 | 4.37 | 125.30 | 5.09 | 147.88 | 7.91 |
| | IQ | 97.00 | 8.71 | 96.83 | 6.83 | 100.69 | 5.83 |
| | LC | 11.83 | 2.98 | 12.97 | 3.51 | 12.34 | 3.46 |
| | ES | 11.73 | 3.18 | 12.51 | 2.83 | 12.50 | 2.81 |
| | IO | 13.60 | 4.96 | 13.30 | 5.80 | 17.88 | 4.08 |
| | | (n=36) | | (n=37) | | (n=28) | |
| 108-117 | MA | 123.97 | 6.89 | 147.89 | 5.51 | 165.25 | 6.55 |
| | IQ | 112.58 | 3.32 | 112.57 | 2.94 | 114.68 | 2.61 |
| | LC | 12.25 | 3.95 | 14.11 | 2.95 | 14.21 | 3.29 |
| | ES | 11.69 | 3.40 | 13.22 | 2.86 | 13.64 | 2.44 |
| | IO | 15.94 | 5.10 | 15.84 | 5.60 | 15.86 | 5.05 |
| | | (n=33) | | (n=33) | | (n=34) | |
| 118-140 | MA | 135.30 | 8.79 | 151.48 | 6.44 | 195.79 | 17.17 |
| | IQ | 125.70 | 5.65 | 124.48 | 5.83 | 126.29 | 5.37 |
| | LC | 11.36 | 3.66 | 13.52 | 2.97 | 15.97 | 2.46 |
| | ES | 11.18 | 2.79 | 13.30 | 3.29 | 14.26 | 2.76 |
| | IO | 15.88 | 5.18 | 15.21 | 4.82 | 20.15 | 6.17 |

[a]MA in months.

Table 4

Descriptive Characteristics of Twelve Subgroups of Subjects in Study III

| IQ Range | Variable | Low MA[a] (110-128) | | Medium MA (129-140) | | High MA (141=161) | |
|---|---|---|---|---|---|---|---|
| | | $\overline{M}$ | SD | $\overline{M}$ | SD | $\overline{M}$ | SD |
| | | (n=122) | | (n=61) | | (n=42) | |
| | MA | 119.53 | 5.91 | 134.51 | 3.03 | 146.31 | 4.82 |
| | IQ | 96.65 | 6.52 | 99.62 | 4.31 | 102.07 | 2.87 |
| 80-105 | LC | 11.60 | 3.52 | 12.15 | 3.35 | 13.95 | 3.11 |
| | ES | 11.66 | 3.13 | 12.34 | 3.03 | 11.90 | 3.02 |
| | IO | 14.74 | 6.67 | 14.34 | 4.69 | 15.95 | 6.39 |
| | | (n=110) | | (n=74) | | (n=101) | |
| | MA | 118.78 | 5.32 | 134.07 | 3.41 | 148.76 | 5.82 |
| | IQ | 110.26 | 2.54 | 110.28 | 2.43 | 110.82 | 2.41 |
| | LC | 12.02 | 3.30 | 12.26 | 3.02 | 13.31 | 3.18 |
| 106-114 | ES | 11.12 | 2.78 | 11.88 | 3.07 | 12.86 | 3.64 |
| | IO | 15.22 | 6.05 | 15.96 | 5.05 | 15.10 | 5.09 |
| | | (n=85) | | (n=71) | | (n=111) | |
| | MA | 117.84 | 4.76 | 133.35 | 3.24 | 150.99 | 6.71 |
| | IQ | 118.27 | 2.31 | 118.15 | 2.29 | 117.85 | 2.20 |
| 115-122 | LC | 11.82 | 3.25 | 12.32 | 3.54 | 14.16 | 3.29 |
| | ES | 11.13 | 2.90 | 12.49 | 3.33 | 12.72 | 3.13 |
| | IO | 15.75 | 6.01 | 15.83 | 5.79 | 16.43 | 5.39 |
| | | (n=41) | | (n=93) | | (n=70) | |
| | MA | 121.80 | 4.17 | 134.44 | 3.05 | 150.51 | 6.85 |
| | IQ | 127.24 | 3.95 | 129.94 | 5.01 | 129.26 | 5.15 |
| 123-140 | LC | 10.73 | 3.22 | 12.25 | 3.34 | 13.94 | 3.04 |
| | ES | 11.15 | 2.31 | 11.92 | 3.41 | 12.71 | 3.31 |
| | IO | 13.80 | 5.02 | 16.25 | 6.48 | 17.41 | 6.31 |

[a]MA in months.

Table 5

Descriptive Characteristics of Subjects

in Study IV (n=568)

| Variable | $\bar{M}$ | SD |
|---|---|---|
| MA | 124.59[a] | 19.51 |
| IQ | 97.44 | 13.92 |
| LC | 11.20 | 3.03 |
| ES | 12.07 | 2.91 |
| IO | 9.28 | 2.98 |

[a]MA in months.

ing to their MAs and dividing these distributions as nearly as possible into quartiles. This leveling procedure was used even though it resulted in some confounding between MA and IQ because it used all of the available data. Making MA and IQ orthogonal would have resulted in a substantial loss in Ss so orthogonal leveling was reserved for Study III which had a much larger sample. Table 2 presents the means and standard deviations of the MA, IQ, LC, ES and IO scores for each of the 12 subgroups in Study 1. Tables 3 and 4 present this same data for Studies II and III along with the IQ ranges that resulted from the leveling procedures used in these studies. For Study II the leveling procedures were identical to those employed in Study I except that only three IQ levels were employed. For Study III the leveling was performed so that the MA ranges were identical for each of the IQ ranges. As a consequence MA and IQ are orthogonal, but only 981 of the 1,345 Ss were used. No MA and IQ leveling was performed for Study IV, and the descriptive statistics for the whole Study IV sample are given in Table 5.

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Insert Tables 2, 3, 4 and 5 about here

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Intelligence and Achievement Measures

The MA and IQ scores were secured by the investigators from group administrations of the Kuhlmann-Finch Tests to the students in their own classrooms. The achievement score was the median grade level equivalent from the Stanford Achievement Test battery which was administered by the classroom teachers in the course of their regular pupil evaluation procedures.

Personality Measures

Reliable and objective scales for measuring LC have existed for some time. The scale used in this study was developed by J. Miller (1963). This 40-item scale also measures ES. Alternate items tap each variable. The scale was administered to classroom-size groups. E read the questions and the Ss marked a "yes" or "no" on machine-scorable answer sheets. Butterfield (1965) found the scale to have an internal reliability coefficient of .89 for LC and .88 for ES.

Incentive Orientation (IO) has been measured in the past (Haywood & Dobbs, 1964; Haywood & Wach, 1966; Weaver, 1966; Haywood & Weaver, 1967) by variations of the Choice-Motivator Scale developed by Hamlin and Nemo (1962). The child has been read a list of 20 pairs of occupational titles and asked to pretend that he is capable of being a worker in any job category listed. He has been told to choose one job from each pair of titles and required to tell his reason for each of his choices. In scoring the test the child's choices have been ignored but his reasons have been scored for their manifest content using a standard system based on factor analytic studies by Kahoe (1966a, 1966b).

The manifest content scoring of the Choice-Motivator Scale was reasonably reliable, i.e., interscorer percentage of agreement equaled approximately 85 (Weaver, 1966) and delayed parallel form reliability was good, i.e., .67 for number of intrinsic responses and .65 for number of extrinsic responses (Hamlin & Nemo, 1962). However, a simpler and more objective scale was desired, and the measure used here was developed to meet these objectives.

The Picture Orientation Test (POT), developed by the authors, was used to measure IO. In a group administration each S was asked to choose

between two occupations or activities and then to select one of six reasons, three intrinsic and three extrinsic, for his choice. Each reason was presented by a picture, and S's score was the number of intrinsic pictures selected for the whole scale. Forty items were given in Studies I, II and III. At that point the scale was revised and a 20-item form was administered in Study IV.

Individual item responses of 760 Ss from Study I and Study III were used to compute an internal consistency reliability coefficient of .79 for the original 40-item test. Then, twenty items were selected on the basis of two criteria: (1) item-total test score correlation $\geq$ .30 and (2) intrinsic response probability between .30 and .60. The 760 answer sheets were then re-scored using only the selected twenty items and a new reliability coefficient of .74 was obtained. Only the selected twenty items were administered to Ss in Study IV. The internal reliability coefficient obtained in that study was .55.

A potential problem that became apparent in revising the POT was the large number of incorrectly marked answer sheets. For example, in Study III, 39% of the Ss had one or more blank answer spaces and/or multimarked answer spaces. The importance of this high percentage of "incorrect" answers may be negligible, since a vertical misplacement of a mark, i.e., on the line above or below the proper answer space, would result in a paper being classified as "incorrectly marked" (since the reason indicated was assigned to the wrong occupational choice); yet such a mistake would not change the total number of intrinsic reasons selected by the S. Furthermore, some such error is always encountered in group testing, and since a major purpose of this investigation was

Table 6

Intercorrelations of the Predictor Variables in Each of the Four Studies

| | Study I (n=351) | | | | Study II (n=293) | | | |
|---|---|---|---|---|---|---|---|---|
| | ES | IO | MA | IQ | ES | IO | MA | IQ |
| LC | .34[b] | .18[b] | .34[b] | .18[b] | .38[b] | .22[b] | .37[b] | .16[a] |
| ES | | .11[a] | .22[b] | .11 | | .04 | .26[b] | .06 |
| IO | | | .28[b] | .21[b] | | | .28[b] | .15[a] |
| MA | | | | .57[b] | | | | .60[b] |

| | Study III (n=1345) | | | | Study V (n=568) | | | |
|---|---|---|---|---|---|---|---|---|
| LC | .38[b] | .13[b] | .37[b] | .20[b] | .16[b] | .03 | .36[b] | .15[b] |
| ES | | .02 | .23[b] | .10[b] | | .03 | .21[b] | .08 |
| IO | | | .19[b] | .14[b] | | | .20[b] | .11[a] |
| MA | | | | .57[b] | | | | .63[b] |

[a] $p < .05$
[b] $p < .01$

to establish predictors that would be practically useful to schools, the data from Ss with "incorrect" answer sheets was included in the analyses. Empirical evidence that the incorrect marking did not distort the results was obtained by doing some data analyses separately for Ss with correctly marked POT answer sheets and for Ss with incorrect answer sheets. The results of these analyses are presented in the Results section, but here it should be noted that the personality scores were as predictive for the "incorrect" as for the "correct" answer sheets.

Procedure

The personality and intelligence tests were administered to classroom-sized groups using enough testers so that four classes could be tested simultaneously. The personality tests were administered first and followed one week later by the intelligence tests. This testing was performed at different times of the school year in different studies. The achievement test battery was administered near the middle of the academic year by the classroom teachers.

## Results and Discussion

### Independence of Predictor Variables

Since multivariate analyses are not profitable if the predictor variables are highly correlated, correlations were calculated between each of the three personality variables, MA and IQ for each of the four studies (See Table 6).

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Insert Table 6 about here

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Table 7

Summary of Multiple Regression Analysis

for All Subjects in Study I (n=407)

| Variable | $r_{ach}$ | regression coefficient | t | unique variance |
|---|---|---|---|---|
| LC | .392 | .056 | 3.33[a] | .044 |
| ES | .232 | .010 | .54 | .004 |
| IO | .317 | .024 | 2.67[a] | .026 |
| MA | .818 | .052 | 19.37[a] | .622 |
| IQ | .463 | .004 | .72 | -.014 |

$R^2 = .682$

$R = .826$

[a] $p < .05$

LC was significantly related to ES, MA and IQ in all four of the studies and to IO in three of the four, ES was related to MA in all four studies and to IO and IQ in one of the four. IO was related to both MA and IQ in all four studies. None of these relationships accounted for enough variance to discount the use of any of the personality variables as predictors. Both MA and IQ were used as predictors even though they were relatively highly correlated in all four studies so that contributions of the three personality variables could be assessed independently of both MA and IQ.

## STUDY I

Study I was designed to provide a preliminary estimate of the utility of leveling elementary school children on MA and IQ before attempting to predict their academic achievement from both intellectual and personality measures. To estimate the value of such leveling it was necessary to determine first the percent of variance uniquely associated with the three personality variables for the total, unleveled sample. This was done by entering the data from all 407 of the Ss into a multiple regression analysis in which MA, IQ, LC, ES and IO were the predictors and academic achievement was the criterion.[4]

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Insert Table 7 about here

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Table 7 summarizes the results of this overall analysis. It presents the zero-order correlation between each of the predictors and achievement, the partial regression coefficient of each predictor,

Table 8

Unique Variance for Each of the Five Predictors in Each of the Twelve Subgroups of Study I[a]

| IQ Range | Variable | Low MA | Medium MA | High MA |
|---|---|---|---|---|
| 70-103 | LC | 23 | 21 | 20 |
| | ES | - 3 | 2 | 1 |
| | IO | 0 | 3 | 0 |
| | MA | 2 | 0 | 2 |
| | IQ | 7 | 0 | 0 |
| 104-111 | LC | 1 | 8 | 4 |
| | ES | 3 | 5 | 2 |
| | IO | 2 | 0 | 0 |
| | MA | 30 | 1 | 0 |
| | IQ | 0 | 0 | 8 |
| 112-121 | LC | 23 | 0 | 0 |
| | ES | 0 | 0 | 0 |
| | IO | 7 | 6 | 2 |
| | MA | 26 | 36 | 0 |
| | IQ | 2 | 1 | 0 |
| 122-140 | LC | 0 | 1 | 9 |
| | ES | 4 | 0 | 11 |
| | IO | 5 | 17 | 8 |
| | MA | 36 | 12 | 29 |
| | IQ | 0 | 3 | -13 |

[a]See Table 2 for descriptive characteristics of 12 groups.

the t value reflecting the reliability of this coefficient, the proportion of variance in achievement that is associated uniquely with each of the five predictor variables, the total amount of variance accounted for by the five predictors ($R^2$) and the multiple correlation (R) between the five variables and achievement. The multiple correlation was .826 which is reliable ($p < .001$) and accounts for .68 of the variance in achievement. MA, LC, and IO all accounted for statistically significant portions of the variance (See Table 7), with MA accounting for the majority (.62) and LC (.04) and IO (.03) accounting for small and approximately equal amounts. Neither ES nor IQ contributed significantly to the multiple correlation.

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Insert Table 8 about here

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Table 8 presents the percent of unique variance in achievement associated with each of the predictor variables for each of the twelve subgroups that resulted from leveling the Ss of Study I on MA and IQ. The pattern of results shown in this table seems to indicate that the leveling procedure revealed strikingly large relationships that were not apparent in the overall analysis. The LC variable accounted for .20 or more of the variance in achievement for children from the lowest IQ range and its contribution decreased rapidly over IQ levels until at the highest level it accounted for only 2% of the variance in achievement. IO, on the other hand, accounted for essentially no variance in achievement at the two lowest IQ levels, but did account for substantial proportions at the higher IQ levels. The patterning

Table 9

Summary of Multiple Regression

Analysis for All Subjects in Study II (n=293)

| Variable | $r_{ach}$ | regression coefficient | t | unique variance |
|---|---|---|---|---|
| LC | .393 | .027 | 1.52 | .021 |
| ES | .290 | .039 | 2.02[a] | .020 |
| IO | .354 | .040 | 3.88[a] | .044 |
| MA | .845 | .052 | 18.24[a] | .646 |
| IQ | .510 | .004 | .66 | .014 |

$R^2 = .745$
$R = .863$

[a] $p < .05$

of the ES variable's unique variances was largely unsystematic.

Study I suggested that leveling on IQ did reveal large and practically-important contributions of both LC and IO to achievement. For children with lower IQs, internal LC (feelings of personal responsibility) was associated with greater achievement. At the higher IQ levels, children with intrinsic IO (preference for rewards such as learning something new) achieved more. Study II was undertaken to determine whether this apparent differential predictability of personality across IQ levels was repeatable.

## STUDY II

The results of the regression analysis for all Ss from Study II combined are summarized in Table 9. The multiple correlation of the five predictors with achievement was .863 which is reliable ($p < .001$) and accounts for .745 of the variance in achievement. As in Study I, MA and IO both contributed reliably to the multiple correlation. Unlike Study I, LC did not contribute reliably: the probability associated with its $t$ value fell between .10 and .05. Also unlike Study I, ES did contribute reliably to achievement.

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Insert Table 9 about here

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Table 10 presents the percent of unique variance in achievement associated with each of the predictor variables for each of the subgroups formed by leveling the students from Study II on MA and IQ. The patterning of these variances across MA and IQ is quite unlike that of Study I. LC was substantially predictive for only one rather than all three of

Table 10

Unique Variance for Each of the Five Predictors in Each of the Nine Subgroups of Study II[a]

| IQ Range | Variable | Low MA | Medium MA | High MA |
|---|---|---|---|---|
| 74-107 | LC | 14 | 1 | - 1 |
| | ES | - 1 | 0 | 4 |
| | IO | 12 | 16 | 9 |
| | MA | 4 | 8 | 12 |
| | IQ | 1 | 0 | 11 |
| 108-117 | LC | 0 | 0 | 2 |
| | ES | 5 | - 1 | 0 |
| | IO | 12 | 7 | 6 |
| | MA | 30 | 3 | 41 |
| | IQ | 14 | 12 | 0 |
| 118-140 | LC | 10 | 20 | 1 |
| | ES | 6 | 1 | 4 |
| | IO | 3 | 4 | 5 |
| | MA | 17 | 9 | 26 |
| | IQ | 8 | 0 | - 1 |

[a]See Table 3 for descriptive characteristics of 9 groups

the MA groups at the lowest IQ levels, and it was substantially predictive for two rather than none of the MA groups at the highest IQ level. Similarly, IO was more predictive at the lower IQ levels rather than at the higher levels as in Study I. Although more of the subgroups showed sizable unique variances for ES in Study II than in Study I, the cells in which ES was most predictive were again distributed haphazardly over the table.

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Insert Table 10 about here

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The interesting pattern of results observed in Study I was not repeated in Study II. Although particular MA-IQ levels again showed larger relationships between personality and achievement than those resulting from the overall analysis, the patterning of this apparent increased predictability was markedly different in the two studies.

## STUDY III

Although the numbers of children involved in Studies I and II were relatively large, leveling on MA and IQ reduced the sizes of the samples upon which the subgroup analyses were performed to only slightly over 30. It is possible that both the patterning observed in the two studies and the discrepancies between the patterning of the two could have risen from chance variations between the intercorrelations of the predictors and criterion. On the other hand, Studies I and II were conducted in different schools, and there seems some possibility that personality determines achievement differently in different schools. Study III was conducted in order to provide a

systematic comparison between four different schools that served children who were similar to those in Studies I and II. It was felt that finding clearly different relationships between personality and achievement in an independent sample of schools would lend support to the conclusion that the discrepancies between Studies I and II were systematic rather than chance. On the other hand, it was felt that if clear differences did not emerge between the four schools in Study III, then the discrepancies between Studies I and II would be better attributed to variation in correlations due to small sample size.

In order to determine whether there were systematic differences between the four schools in Study III, the Ss from each school were leveled on MA and IQ using the nonorthogonal leveling procedures employed in the first two investigations. Four IQ levels and three MA levels were formed for each school. Multiple regression analyses exactly comparable to those used in the first two investigations were calculated for the resulting 48 subgroups. The partial correlations between each of the three personality variables and achievement holding the other personality variables, MA and IQ constant were entered into a 4 x 4 x 3 (Schools x IQ x MA) analysis of the type described by Jones (1968) for comparing correlations. This analysis resulted in a reliable three-way interaction ($\chi^2 = 24.4$, $p < .005$) suggesting that the schools did differ with respect to the way in which MA and IQ interacted to determine the relationship between personality and achievement. Inspection of the patterns of relationship in each of the four schools revealed that this reliable three-way interaction was not

Table 11

Summary of Multiple Regression Analysis

for All Subjects from Orthogonal

Partition of Experiment III (n=981)

| Variable | $r_{ach}$ | regression coefficient | t | unique variance |
|---|---|---|---|---|
| LC | .329 | .046 | 4.88[a] | .041 |
| ES | .204 | .018 | 1.82 | .009 |
| IO | .145 | .015 | 2.92[a] | .010 |
| MA | .687 | .061 | 26.69[a] | .452 |
| IQ | .106 | -.008 | 2.97[a] | -.007 |

$R^2 = .505$

$R = .711$

[a] $p < .05$

systematic and would be extremely difficult to interpret. Nevertheless, MA x IQ analyses were performed separately for the four schools, again using the analytic techniques of Jones (1968) and partial correlations as the dependent measure. None of these four analyses revealed any reliable effects. For no single school did either MA, IQ or the interaction of MA and IQ affect the pattern of correlations at even the .10 probablity level. This failure to find any reliable effects for individual schools taken in conjunction with the unsystematic nature of the variations between partial correlations within and between schools leads to the conclusion that schools are not a reliable determinant of the relationship between personality and achievement.

In view of the failure to find interpretable differences between the schools of Study III, the data from the four schools were combined and used to level orthogonally on MA and IQ. In Studies I and II it was not feasible to vary MA and IQ orthogonally. The large number of students involved in Study III did make that feasible. Table 11 presents the results of an overall multiple regression analysis using only those Ss from Study III who fell into one of the 12 groups formed when the entire sample from the study was leveled orthogonally.

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Insert Table 11 about here

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Table 11 shows that for these Ss from Study III the multiple correlation between the predictors and achievement was .71 ($p < .001$). LC, IO, MA and IQ contributed significantly to this .50 variance

Table 12

Unique Variance for Each of the Five Predictors in Each of the Twelve Orthogonal Subgroups of Study III[a]

| IQ | Variable | Low MA | Medium MA | High MA |
|---|---|---|---|---|
| 80-105 | LC | 6 | 4 | 10 |
| | ES | 0 | 0 | 0 |
| | IO | 2 | 2 | 0 |
| | MA | 8 | 3 | 1 |
| | IQ | 1 | 2 | 6 |
| 106-114 | LC | 7 | 0 | 1 |
| | ES | 2 | 5 | 2 |
| | IO | 6 | 13 | 0 |
| | MA | 23 | 2 | 4 |
| | IQ | 0 | 0 | 1 |
| 115-122 | LC | 3 | 1 | 4 |
| | ES | 2 | 3 | 2 |
| | IO | 1 | 5 | 0 |
| | MA | 24 | 13 | 22 |
| | IQ | 1 | 5 | 0 |
| 123-140 | LC | 9 | 5 | 9 |
| | ES | 1 | 0 | 0 |
| | IO | 0 | 3 | 7 |
| | MA | 2 | 16 | 8 |
| | IQ | 0 | 6 | 1 |

[a]See Table 4 for descriptive characteristics of 12 groups.

in achievement accounted for by this multiple correlation. ES did not contribute reliably to the prediction of achievement among these Ss. As in Study I, LC accounted for just over .04 of the variance in achievement. MA and IO, though significant as in Study I, did not account for quite as much of the variance as in that study.

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Insert Table 12 about here

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Table 12 presents the unique variances of each of the five predictor variables for each of the 12 groups that resulted from leveling the Ss of Study III orthogonally on MA and IQ. There is considerably less variability between the unique variances of the 12 groups than in either Studies I and II. LC accounts for more variance than either IO or ES and accounts for approximately the same amount of variance at each MA and IQ level. IO also accounts for approximately the same amount of variance in each of the MA and IQ levels. The variances associated with ES are negligible throughout the range of MA and IQ represented.

## STUDIES I, II AND III COMBINED

Since the subgroups formed by leveling orthogonally on MA and IQ in Study III were substantially larger than the subgroups employed in Studies I and II, the lack of systematic variation between either IQ or MA levels in Study III suggests strongly that the presence of such variations in the first two studies were due to small size of the subgroups. The failure to find systematic differences between schools in Study III suggests that the differences between the results of Studies I and II are not due to reliably different patterns of

Table 13

Summary of Multiple Regression Analysis

for All Subjects from Studies

I, II and III (n=1989)

| Variable | $r_{ach}$ | regression coefficient | t | unique variance |
|---|---|---|---|---|
| LC | .397 | .047 | 6.72[a] | .038 |
| ES | .245 | .012 | 1.69 | .005 |
| IO | .248 | .018 | 5.06[a] | .016 |
| MA | .833 | .054 | 47.84[a] | .654 |
| IQ | .452 | .003 | 1.46 | -.010 |

$R^2 = .703$

$R = .838$

[a] $p < .05$

relationships between personality and achievement between the schools used in the two studies. These considerations, along with the comparability of the data collection procedures employed in the three investigations, lead us to combine the data from them in order to secure the largest possible sample from which to estimate the magnitude of the contribution of each of the personality variables to achievement. The results of a regression analysis using all 1989 of the students in these three investigations are shown in Table 13.

---

Insert Table 13 about here

---

Table 13 shows that LC, IO and MA contributed significantly to the multiple correlation of .84 with achievement. Neither ES nor IQ contributed significant unique variance. LC contributed approximately .04 of the .70 variance accounted for in achievement. IO contributed approximately .02 and MA contributed .65.

In order to evaluate statistically the extent to which the three personality variables contributed differentially to the prediction of achievement, the 1989 students from the three investigations were randomly divided into 20 subgroups of approximately 100 Ss each. Regression analyses were performed and unique variances were calculated for each of these 20 randomly generated subgroups. The mean unique variance contributed by LC, ES and IO was 4.15, .85 and 2.05 respectively. These means, which agree quite closely with the unique variances resulting from the analysis of all students combined (See Table 13), were compared by means of a 3 x 20, Personality Variable x

Subgroup analysis of variance. The main effect for Personality was tested against the Personality x Subgroup interaction and was found to be reliable ($F_{2/38} = 10.05$, $p < .01$). This main effect was further evaluated by means of $t$ tests which showed that LC accounted for reliably more of the variance in achievement than either IO ($t = 2.84$, $p < .01$) or ES ($t = 4.46$, $p < .01$). IO tended to account for more variance than ES ($t = 1.62$, $p < .10$).

In order to evaluate statistically the earlier conclusion that the pattern of relationships between personality and achievement do not vary across IQ and MA levels, the combined samples of the three studies were leveled orthogonally into four IQ and three MA levels. Each of the resulting 12 subgroups was randomly divided in half. Unique variances were calculated for each of the 24 subgroups and were employed in a two-entry/cell, 4 x 3 x 3, IQ x MA x Personality Variable, analysis of variance. The only statistically reliable effect that resulted from this analysis was the main effect for Personality Variable. This effect reflected the same differences reported in connection with the foregoing analysis for the 20 randomly generated subgroups.

In order to evaluate the possibility that the size of the relationships observed between personality and achievement was attenuated by including personality answer sheets with response errors on them, the combined samples of the three studies were sub-divided into a group with perfect answer sheets and a group with answer sheets with errors. Two multiple regression analyses were performed. The results of the two were virtually identical and the same as the results of the analysis reported above the combined the "correct" and "incorrect" answer sheets

Table 14

Summary of Multiple Regression Analysis

for All Subjects from Study IV (n=568)

| Variable | $r_{ach}$ | regression coefficient | t | unique variance |
|---|---|---|---|---|
| LC | .359 | .039 | 3.25[a] | .031 |
| ES | .181 | .003 | .26 | .001 |
| IO | .159 | .001 | .10 | .000 |
| MA | .802 | .051 | 21.06[a] | .591 |
| IQ | .525 | .004 | 1.36 | .022 |

$R^2$ = .645
R = .803

[a] $p < .05$

Table 15

Partial Correlations Between Each Personality Variable and Achievement for Studies I, II and III and for Study IV

| | I & II & III | IV | z |
|---|---|---|---|
| LC | .149 | .136 | .28 |
| ES | .038 | .011 | .58 |
| IO | .113 | .004 | 2.32[a] |

[a] $p < .05$

(See Table 13).

## STUDY IV

Study IV was conducted to determine whether different patterns of relationships between personality and achievement would emerge from groups leveled on socioeconomic variables. The students involved in the first three studies all came from schools that served comparable areas that can best be characterized as middle to upper-middle class. The students in Study IV came from areas that are best characterized as lower and lower-middle class (See Table 1).

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Insert Table 14 about here

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The results of a multiple regression analysis predicting achievement for all 568 of the Ss in Study IV are shown in Table 14. Only LC and MA contributed reliably to the multiple correlation of .803. The magnitude of the relationship between LC and achievement is very close to that observed in the earlier studies, and the variance due uniquely to MA is also quite consistent with that observed in the other investigations. The only apparent discrepancy between the earlier and the present findings is the failure of IO to contribute significantly unique variance to the prediction of achievement.

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Insert Table 15 about here

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Table 16

Summary of Multiple Regression Analysis

for All Subjects in Study I (n=351)

Using IO-item Measure of Incentive Orientation

| Variable | $r_{ach}$ | regression coefficient | $\underline{t}$ | unique variance |
|---|---|---|---|---|
| LC | .410 | .068 | 3.97[a] | .058 |
| ES | .210 | -.017 | .88 | -.006 |
| IO | .353 | .048 | 3.34[a] | .040 |
| MA | .818 | .053 | 17.99[a] | .618 |
| IQ | .453 | -.003 | .55 | -.011 |

$R^2$ = .700
R = .837

[a] $\underline{p} < .05$

Table 15 shows the partial correlations between achievement and each of the three personality variables holding the other two personality variables, MA and IQ constant for Study IV and for the combined data of the first three investigations. The two LC correlations were compared to one another, as were the two ES and two IO correlations. The results of these comparisons are also shown in Table 15. There were no reliable differences between the LC and ES correlations, but the correlation between IO and achievement was larger in the first three investigations than in the fourth.

In order to provide an additional test of the differences between the first three investigations and the fourth with respect to the unique relationship between each of the three personality variables and academic achievement, the Ss from Study IV were randomly divided into 10 groups of approximately 60 students each. Unique variances were calculated for each of these randomly established groups. The mean unique variances for LC, ES and IO were 3.2, .7 and .6 respectively. Each of these means was compared by means of a $t$ test to its corresponding mean obtained from the 20 random samples of the first three studies combined. These tests revealed that neither LC nor ES predicted differentially ($t < 1.0$) in the two studies. There was, however, a reliable difference between the unique variances attributable to IO. More variance was accounted for in the first three investigations than in the fourth investigation ($t = 1.81$, $p < .05$).

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Insert Table 16 about here

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Since a 40-item version of the POT was used to measure IO in the first three investigations and a 20-item version was used in Study IV, the failure of IO of predict achievement in Study IV might be attributed to lower reliability of the 20-item scale. In order to rule out this possibility, the POT was rescored for all Ss in Study I. Only those 20 items that were used in Study IV were used in this rescoring. A multiple regression analysis was performed using the 20-item POT scores. The results of this analysis are shown in Table 16. It may be seen that the results are essentially the same as those obtained with the 40-item measure (See Table 7). A comparison of the partial correlations resulting from this analysis with those from the analysis of Study IV showed IO was more predictive in Study I than Study IV ($z = 2.63$), but that LC was equally predictive ($z < 1.0$) in the two studies. The failure of IO to predict in Study IV cannot be attribute to the lesser reliability of the 20-item scale.

## CONCLUDING DISCUSSION

The goal of the first three studies was to determine whether practically significant increases could be made in the prediction of elementary school pupils' academic achievement by adding personality measures to intellectual measures after leveling pupils on their mental ages and intelligence quotients. In the first investigation the leveling procedure seemed to have revealed large and practically significant correlations between LC and IO for pupils of below average and very high IQ respectively. Study II failed to repeat these particular relationships. Study II did show other large relationships between personality and achievement, thereby suggesting that the exact way in which MA and

IQ interact to determine the relationship between personality and achievement varied with unknown characteristics of the schools from which students were sampled. An alternative interpretation was also suggested by the discrepancy between the results of the first two studies. Namely, the relatively small sample sizes of the groups after leveling on MA and IQ might have produced variations in the unique variances because of variation due to sampling error in the zero-order correlations from which they were calculated. This latter and less interesting interpretation was supported by the results of the much larger third investigation.

The hypothesis that leveling students on MA and IQ would reveal strong relationships between personality and achievement received no support in the present investigations. The Locus of Control and Incentive Orientation scales were equally predictive at all of the sampled MA and IQ levels. LC accounted for approximately 4 percent of the variance in academic achievement and Incentive Orientation accounted for approximately 2 percent for children of all MA and IQ levels in Studies I, II and III combined. Internal LC children who feel that they are responsible for what happens to them achieved more than external LC children who feel that others control what happens to them. Children who prefer to work for intrinsic rewards such as making something beautiful achieved more than children who prefer to work for extrinsic rewards such as being comfortable.

Several factors could account for the discrepancy between the present results and those of Haywood (1968a, 1968b). Haywood found that

his measure of IO was more predictive of achievement for children with low IQs than for children with average or high IQs. His measure of IO was somewhat different than the one employed here, and there is some question of how comparable the two are. Probably a more important factor is that Haywood used only the extremes of his IO dimension, whereas the present investigation used children unselected for IO. If this is the critical factor, increasing the reliability of the IO measure might result in different results than those observed in the present studies. Haywood's investigation was conducted in an inner-city area in Toronto, Canada where a high proportion of the students are immigrants from Europe. Cultural factors could therefore account for different results.

This latter possibility seems particularly worth exploring since the present comparison of the first three studies and Study IV indicates that leveling on socioeconomic factors does effect the relationship between personality and achievement. The IO measure was more predictive with the middle-class sample of the first three investigations than with the lower class sample of Study IV. The potential of further exploring the effects of leveling on socioeconomic factors seems especially great in view of the grossness of the leveling that made a difference in the present investigations. The educational attainment and income data upon which the leveling was based was applicable only to whole schools, and there was undoubtedly a good deal of uncontrolled variation within the schools. Furthermore, the census data employed for this leveling was nearly ten years old. A determination of the educational and financial characteristics of the families of individual children from more up-to-date data could well reveal much larger differences between

groups leveled on these factors.

Although the LC and IO relationships observed in the present investigations were highly reliable statistically, the two personality variables together accounted for only 6 percent of the unique variance in achievement in the first three studies and only 4 percent in Study IV. Such small increases in predictive validity seem practically insignificant compared to the more than 50 percent of the variance in achievement accounted for by MA. Still, interesting questions remain about why these variables should be related at all to academic achievement. The failure of ES to relate to achievement indicates that at least the relationship between LC and achievement is not due to nonspecific test taking variables. LC and ES were assessed with a single scale in which alternate items tapped the two variables. The LC and ES scores should differ therefore only with respect to the specific personality factors that their respective items tap.

Experimental investigations are required to determine the functional significance of the LC and IO variables in learning situations. For example, the experiments reported in Appendix A examined how LC interacts with variations in several parameters of a free recall task. These studies indicate that LC is related to free recall learning and that the probable reason for this is that it is related to the amount of effort that children exert during the acquisition phase of the recall task. These same studies also showed that IO is not related to free recall learning. Evidently the importance of variations in IO is not that it determines how much someone learns once he is in a learning

situation. Perhaps IO has to do with the character of situations that a child is willing to enter, rather than how he responds having been placed in a situation. Intrinsically-oriented children may spontaneously enter situations that provide more learning opportunities than do extrinsically-oriented children.

## Footnotes

1. The research reported here was supported primarily by U. S. Office of Education grant OEG-6-9-0018126-0050 (057). It was also supported by the University of Kansas Biomedical Sciences Support Grant and U. S. P. H. S. grants HD-00183 and HD-00870. Kansas School District 110 and Kansas City, Kansas provided elementary school children who served as subjects. Carlotta Young, Carman Hanna, Donna Gribble, Bea Gundle and Richard Steiber assisted in data collection and analysis. Delece Hendricks typed the manuscript.

2. Haywood, personal communication

3. This leveling included 46 second graders not listed in Table 1. When data from other studies were combined with the Study I data, the second graders were not included because no second grade data was collected in the later studies.

4. Multiple regression analyses were all performed by GE635 computer using the BMD03R program (Dixon, 1968). The output of this program was used to calculate unique variances using the formula

$$\frac{(s_{\text{predictor}})\,(r_{\text{achievement x predictor}})\,(\text{regression coefficient})}{s_{\text{achievement}}}$$

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# APPENDIX A

# Personality and Learning among Elementary School Pupils [1]

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## Abstract

Four experiments evaluated the effects of the personality variables Locus of Control (LC) and Evaluative Style (ES) upon incidental and intentional learning of elementary school children. LC was related differentially to the incidental learning of the names of completed and incompleted puzzles. Internal LC children learned more completed and fewer incompleted puzzle names than External LC children. In each of three experiments, LC was related to free learning when material was presented only once. Internal LC children learned more. LC was also related to rate of learning in a free recall task in which material was presented repeatedly. The greater rate of improvement from trial to trial of the Internal LC children was exactly equal to their superiority in the single presentation condition. Internal LC children were also found to respond more strongly to a change in difficulty of the free learning task. These results were interpreted as indicating that the Internal children respond with greater effort during learning than External LC children. ES was related only to incidental learning of incompleted tasks and was concluded to be an inconsequential correlate of children's learning.

# Personality and Learning among Elementary School Pupils[1]

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Despite the impressive regularities which have been observed in children's performance on learning tasks (cf. Reese, 1963; White, 1963), practically all learning experiments reveal great variability between subjects. Even when children are grouped homogeneously with respect to age and intelligence, marked individual differences in learning are observed. Investigators who have been concerned with accounting for individual differences in learning among adults often sought relationships between personality measures and rate of learning. The most outstanding example of the fruitfulness of this approach is the well-documented finding that manifest anxiety is related to rate of eyelid conditioning (Spence & Spence, 1964, 1966). The purpose of the present investigations is to examine the relationships between children's learning and personality variables. The premise of the first experiment is that between-subjects' variability in children's learning arises in part from individual differences in the personality variables Locus of Control (LC) and Evaluative Style (ES).

The LC concept grew from Rotter's (1954) Social Learning Theory and refers to the extent to which adults believe that they control, through their own behavior, the rewards and punishments which they receive. The concept has recently been employed in investigations of children (e.g., Bialer, 1961; Butterfield, 1964, 1965; Cromwell, 1963). These investigations indicate that some children may be characterized as having an Internal Locus of Control

(ILC) in that they usually perceive themselves as the controlling agents in whether they receive rewards or punishments. Others may be characterized as having an External Locus of Control (ELC) in that they usually see the rewards and punishments which they receive either as uncontrolled or as controlled by events which are unrelated to their own behavior.

There are at least two reasons to predict that Internal children will learn more rapidly than Externals. ILCs, since they see themselves as being in control, might involve themselves more actively in the learning process. For example, they might rehearse more actively than ELCs. Alternatively, ILCs might react more strongly to information about how well they are performing. An important aspect of the LC concept is that children with ILCs are predicted to react with feelings of success to cues such as satisfactory task completion and with feeling of failure to cues such as task incompletion. Children with ELCs are predicted to react with lesser feelings of success to cues such as task completion and with lesser feelings of failure to cues such as task incompletion. The notion underlying these predictions is that perceived control is necessary to experience feelings of success and failure (Cromwell, 1963). If feelings of success and failure are reinforcing, then LC should be related to the amount of reinforcement a child "receives" from correct and incorrect responses and should, therefore, account in part for differences in learning between children.

The ES concept was first formulated by proponents of client-centered therapy (Rogers, 1951) and was extended to children by Miller (1963).[2]

The idea underlying the ES concept is that people differ with respect to whether they evaluate the adequacy of their performance for themselves or rely primarily upon the evaluative reactions of others. Children who typically evaluate their own performance are said to have a Self-Evaluative Style (SES) and children who rely on others for the evaluation of their behavior are said to have an Other-dependent Evaluative Style (OES). Children with SES might learn faster than children with OES. The premise underlying this hypothesis is that self-evaluations are reinforcing just as others' evaluations are reinforcing. Since the SES child evaluates himself more than the OES child, the SES child "receives" more reinforcement and should, therefore, learn faster than the OES child.

## Experiment I

The first study reported here was designed to test the predictions that ILC and SES children learn incidental material faster than ELC and OES children. A Zeigarnik incompleted-task procedure (Butterfield, 1964) was employed to test these hypotheses. All children were given puzzles to assemble but were only allowed to finish three of them. The children were told the names and shown a picture of each puzzle prior to attempting to assemble it. After working on all six puzzles, the children were asked to recall the names of as many as they could. The scores of interest were the numbers of completed and incompleted puzzle names the children with different personality types were able to recall. The children were divided into four groups according to their scores on an LC measure and an ES measure. Thus, there were SES-ILC, SES-ELC, OES-ILC, and OES-ELC groups. The predictions were based upon the premises that (1) the ILC children more than the ELC children would experience feelings of success

following puzzle completion and feelings of failure following interruption, and (2) the SES children more than the OES children would positively evaluate themselves for the completed puzzles and negatively evaluate themselves for incompleted puzzles. It was assumed that the association of each of these two personality-determined sources of reinforcement with the names of the puzzles would facilitate the learning of the names of the completed puzzles and interfere with the learning of the names of the incompleted puzzles.[3] The predictions concerning completed task recall were that ILC children would recall more than ELC children and that SES children would recall more than OES children. Also, considering LC ard ES together, it was predicted that SES-ILC children would recall the greatest number of completed puzzles, the SES-ELC and OES-ILC would recall an intermediate number and the OES-ELC children would recall the fewest completed puzzles. The predictions concerning incompleted task recall were that ILC children would recall fewer puzzles than ELC children. Finally, considering LC and ES together, it was predicted that the OES-ELC children would recall the greatest number of incompleted puzzles, the SES-ELC and OES-ILC children would recall an intermediate number and the SES-ILC children would recall the fewest incompleted puzzles.

## Method

Subjects. The Ss were 56 fourth- and fifth-grade pupils selected from a population of 289 fourth and fifth graders on the basis of their LC, ES and MA scores. The 289 Ss were divided into ILC-SES, ILC-OES, ELC-SES, and ELC-OES groups of 14 Ss each by eliminating approximately the middle one-third of both the LC and ES distributions and by selecting

from the remaining Ss so that the four groups would have equal means and standard deviations on MA scores derived from the Peabody Picture Vocabulary Test (Dunn,1959).

Personality Measures. Both LC and ES scores were derived from a group-administered scale developed by Miller (1963). This scale is composed of 20 LC and 20 ES questions which the subjects answer either "yes" or "no." An example of the questions which tap LC is "When nice things happen to you, is it only good luck?". A "yes" answer to this question indicates an ELC. An example of the questions which tap ES is "When it comes to your own success are you the one who is really the best judge?". A "yes" answer to this question indicates SES. In order to control for "yes" and "no" response preferences, equal numbers of "yes" and "no" responses are scored in the ILC and SES directions. The reliability of both personality scales is high. Miller administered the scale to 279 fifth and sixth graders and found internal consistency coefficients of 0.84 and 0.83 for the LC and ES variables respectively. In the present population internal consistency coefficients of 0.89 and 0.88 were found for the LC and ES measures respectively. Scores on the two personality measures are significantly related but the relationship accounts for an inconsequential percentage of variance. Miller found a correlation of 0.21 ($p < .05$) in a population of 279 fifth and sixth graders. In the present population, there was a correlation of 0.27 ($p < .05$).

Experimental Task. Six puzzles were made by mounting 8 x 10 inch, gloss, enlargements of plates 32-2, 32-5, 39-3, 34-4. 39-4 and 40-4 from the Peabody Picture Vocabulary Test on 8 x 10 x 1/2 inch boards and cutting each of them into six 3 1/3 x 4 inch rectangles. These pictures

and the names assigned them in the Peabody Test fell below the basal level of all Ss used in the study and were assumed to be equally familiar to all Ss. The order in which the puzzles were presented was randomly predetermined for each S as was the choice of the three puzzles which each S was allowed to complete. For the remaining puzzles, interruption always occurred when the S had four of the six pieces assembled.

Procedure. A male E and a female assistant administered group forms of the Peabody Picture Vocabulary Test and the Locus of Control and Evaluative Style Inventory to each of the 10 classes from which Ss were drawn. Subsequent to the selection of Ss as described above, the male E conducted the experiment proper. The testing of Ss always began shortly after school convened in the morning and continued until school adjourned in the afternoon. Subjects were run consecutively and individually with minimal chance for intercommunication. The teacher instructed the Ss and their fellow pupils not to ask or volunteer any information about what they did while with E. When S arrived at the experimental room, he was greeted by E, asked to be seated and immediately introduced to the experiment by means of the following instructions:

> The reason I am seeing you today is to give you some intelligence tests. These tests tell me how smart you are. I've given them to lots of fourth (or fifth) graders so I know how fast you should be able to do them. I'm going to time you with this stop watch (extending watch toward S) to see if you do them as fast as you should. Whenever you haven't finished a test in time, I'll stop you. Here's the first test. It's a puzzle. When it's put together it makes a (name of picture) like this (show child picture of correctly assembled puzzle). Put it together as fast as you can.

All Ss were allowed to assemble completely three of the puzzles but were interrupted on each of the other three after they had correctly assembled

four of the puzzles' six pieces. When Ss were interrupted, they were told: "Your time is up. You didn't finish that one in time." When Ss completed the task, they were told: "That's fine. You finished that one in time." Each new puzzle was introduced to the Ss by means of one of the following statements: "This puzzle makes a (name of the picture) like this (show child picture of correctly assembled puzzle). See if you can put it together fast enough." "This puzzle makes a (name of puzzle). See how fast you can put this one together."

Immediately after the presentation of all six puzzles the Ss were asked to recall the names of as many of the puzzles as they could. The Ss were told of this request that "The next part of the test is to see how many of the puzzles you can remember. Tell me the names of as many of the puzzles as you can." E recorded Ss recall responses.

After the experiment was over, all Ss were allowed to complete each of the puzzles that had been interrupted. They were liberally praised for their performance.

The E did not know the personality group of any S until all of the data was collected.

Results

Table 1 presents the mean number of completed and incompleted puzzles recalled by each of the four groups of subjects.

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Insert Table 1 about here

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Completed Task Recall. The prediction that ILC children would recall more completed tasks than ELC children and that SES children would recall more than OES children was evaluated by means of a 2 x 2 (ILC-ELC x SES-OES) factorial analysis of variance. The main effects for both LC ($F_{1/52} = 7.44$, $p < .01$) and ES ($F_{1/52} = 5.59$, $p < .05$) were reliable, confirming the prediction. ILC children recalled a mean of 2.53 completed puzzles whereas ELC children recalled a mean of 2.0. SES children recalled a mean of 2.50 completed puzzles whereas OES children recalled a mean of 2.10. The interaction between LC and ES was not significant ($F < 1.0$). Table 1 shows that the four groups did order themselves as predicted: ILC-SES recalled the most completed puzzles, ILC-OES and ELC-SES recalled an intermediate number and ELC-OES recalled the fewest completed puzzles. A one-way analysis of variance indicated that there were significant differences between the four groups ($F_{3/52} = 4.35$, $p < .01$). Independent $t$ tests indicated that the ILC-SES group exceeded each of the other three groups, the ILC-OES group was lower than the other three (one-tailed $p < .05$) and the ELC-SES and ILC-OES groups did not differ from one another ($t = 1.23$, $p < .10$). These results concerning completed task recall thus support the hypotheses that LC and ES are associated with individual differences in children's learning.

Incompleted Task Recall. The prediction that ILC children would recall fewer incompleted tasks than ELC children and that SES children would recall fewer than OES children was evaluated by means of a 2 x 2 (ILC-ELC x SES-OES) factorial analysis of variance. The main effect for LC was reliable ($F_{1/52} = 6.42$, $p < .05$), but neither the main effect for ES nor the interaction between LC and ES approached significance (both $F$s $< 1.0$). The significant LC effect reflected the predicted difference: ILC children recalled a mean of 1.64 incompleted puzzles while ELC children recalled a mean of 2.04

puzzles. Table 1 shows that the predicted ordering of the four groups was not obtained. The ELC-SES group recalled the greatest number of incompleted puzzles rather than an intermediate number. The ILC-SES, ILC-OES and ELC-OES groups did order themselves as predicted, but none of the differences between these groups was reliable. These results concerning incompleted task recall offer further support for the view that LC is related to individual differences in learning, but they do not support the hypothesis that ES is so related.

## Discussion

Since LC was related to recall of both completed and incompleted tasks there seems little question that it is related to children's incidental learning. Whether it is related to intentional learning remains an open question. The ES variable was related to incidental learning of the names of completed tasks only. Its failure to correlate with incidental learning of incompleted tasks raises the question of whether the statistically reliable relationship observed with recall of completed tasks is repeatable. The second and third experiments examine whether LC and ES are related to intentional learning. They thus offer an opportunity to determine the generality of the relationship between LC and learning and, by systematic replication, to determine whether ES is an important personality variable to consider when designing learning experiments for children. If ES is not related to intentional learning, then it would appear to be of little consequence in the investigation of learning since it would be related to incidental learning only when task completion cues are present.

## Experiment II

Experiment II examined free recall of lists of digits presented either repeatedly or only once. Under the Repeated condition, the Ss were first exposed to a list, then they recalled it, then exposed to the same list again, then recalled it again, etc. In the Unrepeated condition, the Ss were first exposed to the list, then they recalled it, then they were exposed to a different list, recalled it, etc. In the Repeated condition there was thus an opportunity for the Ss to determine how well they recalled on a preceding trial, while there was no such opportunity in the Unrepeated condition. The purpose of these two conditions was to gain some preliminary notion of how the personality variables might be related to learning. Certain interactions between Condition (Repeated-Unrepeated) and Personality (LC or ES) would suggest that the personality variables had specific functions. For example, if personality was not related to learning in the Unrepeated condition, but was related in the Repeated condition, it would indicate that the personality variables partly determined Ss interpretation of or reaction to task feedback indicating correctness of recall, and would seem to implicate some reinforcement process.

### Method

Subjects. The Ss were 96 fifth-and sixth-grade pupils selected from a population of 300 fifth and sixth graders on the basis of their LC, ES and MA scores. The 300 Ss were divided into ILC-SES, ILC-OES, ELC-SES and ELC-OES groups of 24 each by splitting the LC and ES distributions at their medians and then systematically eliminating Ss until each contained an equal number and so that the groups would

have the same means and standard deviations on MA scores derived from group-administered Kuhlmann-Finch Test.

Personality Measures. As in Experiment I, the LC and ES scores[4] were derived from the group-administered scale developed by Miller (1963).

Experimental Task. Group-administered free recall tasks were employed to collect the learning data. Instructions and stimulus sequence were tape-recorded to insure standard procedures. The stimulus materials were 8-item lists of two-digit numbers, recorded at a presentation rate of one every 4.0 seconds. Following each tape-recorded list there was a 30-second period of silence during which Ss were to write down as many of the digits as they could remember. The Ss recorded their responses in tablets that were constructed so that each page was a different color. By having the Ss turn a page just prior to the reading of each list it was possible to insure that none cheated during the Repeated presentation and to be certain by merely scanning the color of the up-turned page the S was using the proper portion of the test booklet.

For both the Repeated and Unrepeated conditions, lists of randomly generated two-digit numbers were tape recorded. For the Unrepeated condition eight different lists of eight numbers were used. For the Repeated condition, a single list of eight numbers was recorded eight times.

Procedure. All Ss were tested three times in classroom-size groups. The Kuhlmann-Finch Test was administered in one testing session. Approximately two days later the LC-ES measure was administered. Approximately one week later, the learning task was administered. For one-half of the Ss, the Repeated condition came before the Unrepeated, and for

the other half the Unrepeated preceded the Repeated condition.

Results

A preliminary, omnibus analysis of variance was performed. The dimensions of this analysis were LC (Internal-External), ES (Self-Other), Condition (Repeated-Unrepeated), Order (First-Second) and Trials (1 to 8). The criterion measure was the number of correctly recalled items per trial. This analysis revealed reliable main effects for Trials ($F_{7/560}$ = 56.4, $p$ <.001) and Conditions ($F_{1/80}$ = 1313.5, $p$ < .001) as well as Trials x Conditions ($F_{7/560}$ = 49.9, $p$ < .001) and LC x Conditions interactions ($F_{1/80}$ = 7.0, $p$ < .01). The Trials main effect and Trials x Conditions interactions reflect the unsurprising fact that the Ss improved more over trials in the Repeated than the Unrepeated condition. The LC x Conditions interaction arose from the fact that the ILC and ELC Ss differed in the Unrepeated but not in the Repeated condition. In the Unrepeated condition the ILC group recalled an average of 3.64 items per trial whereas the ELC group recalled an average of only 3.05 items. (See Figure 1) In the Repeated condition, the ILC Ss recalled 6.83 whereas the ELC recalled 6.75 items.

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Insert Figure 1 about here

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The failure to find LC differences in the Repeated condition could be due to a ceiling effect. A majority of the Ss in both the ILC and ELC groups had reached asymptote by the third trial of the Repeated condition. Therefore, Experiment III was performed using longer lists.

## Experiment III

### Method

Subjects. The same 300 Ss who served as the population for Experiment II, were the population for Experiment III. As in Experiment II, 96 were selected by dividing the population at its median LC and ES scores into ILC-SES, ILC-OES, ELC-SES and ELC-OES groups. Kuhlman-Finch MA scores were then used as a basis for systematically eliminating Ss until four groups of 24 Ss each were selected. While these Ss came from the same population, the division into groups was made independently of Experiment II.

Procedures. The procedures were identical to those in Experiment II except that the lists to be learned contained 12 rather than 8 two-digit numbers.

### Results

Data from the Unrepeated and Repeated condition were analyzed separately by means of LC (Internal-External) x ES (Self-Other) x Order (First-Second) x Trials (1 to 8) analyses of variance. The only reliable effect for the Unrepeated condition was the main effect for LC ($F_{1/80} = 4.38$, $p < .05$). The ILC group recalled an average of 4.58 items per trial where as the ELC group recalled an average of only 4.02 items (See Figure 1).

In the Repeated condition there was a reliable main effect for Trials ($F_{7/560} = 165.4$, $p < .001$), and reliable interactions for LC x Order ($F_{1/80} = 7.64$, $p$ .01) Trials x Order ($F_{7/560} = 3.16$, $p < .01$) and LC x Trials x Order ($F_{7/560} = 2.33$, $p$ <.05). Figure 2 depicts the results reflected by these effects. It may be seen that when the Repeated condition came second

the only effect was for Trials. However, when the Repeated condition came first the Internal group exceeded the External group and this superiority was greater on the later trials then on the earlier trials. The ILC Ss recalled approximately 0.5 more items that the ELC Ss on trial 1 and their superiority over the ELCs increased by 0.5 items per trial so that on trial 8 they recalled 4 more items than the ELC Ss.

Discussion

The ES variable was not related to intentional learning in either the Repeated or Unrepeated conditions of Experiment II or III. Since it also failed to relate to incidental learning of the names of incompleted tasks, the ES variable would appear to be of negligible importance in accounting for individual differences in children's learning.

The LC variable, on the other hand, related not only to both types of incidental learning in Experiment I but, also, to intentional learning of Unrepeated materials in Experiments II and III. It was also related to the intentional learning of Repeated material when it came first and when the artificial ceiling that was present in Experiment II was removed in Experiment III. The precise reason for the relationships between LC and learning is not completely clear, but it does not seem to be solely a reinforcement process. The differences observed in the Unrepeated conditions could not be due to reinforcement of correct responses, since there was no feedback about correctness of responding. Furthermore, the greater increase over trials by the ILC Ss in the Repeated condition of Experiment III was precisely equal to the difference on the first trial of the Repeated condition and to the difference observed in the Unrepeated

condition. This suggests that the greater improvement of the Internals was not due to the feedback inherent in the Repeated condition. Rather, it would seem that the ILC Ss simply learned more of the items each time they were presented. This could be due to their exerting greater effort or to employing a more efficient acquisition strategy.

The LC x Order interaction observed in the Repeated condition of Experiment III could be taken to indicate that the superiority of Internal over External Ss is extremely fragile. That is, it may indicate that a small amount of learning experience offsets the advantage which Internals have over Externals, since when both groups experienced the Unrepeated task first, they did not differ in performance on the Repeated task. On the other hand, this interaction might be a systematic one which enhances the importance of differences between Internals and Externals.

The Repeated condition differed from the Unrepeated condition not only with respect to the amount of feedback provided, but also with respect to its ease. The Unrepeated condition required more sustained effort than the Repeated condition. This is evident not only on rational grounds, but also from the Ss' reactions to the task. There were often audible comments to the effect that the Unrepeated condition was much more difficult. This suggests that the failure to observe differences between the Internals and Externals on the Repeated Task when it came after the Unrepeated reflected a differential reaction of the two groups of Ss to the change in difficulty between the two conditions. It is impossible to evaluate this possibility in Experiment III, because of the counter-balancing of task presentation. No Ss received either the Repeated or

Unrepeated conditions in both halves of the experiment.

## Experiment IV

Experiment IV examined the reactions of Internal and External Ss to change in difficulty of Unrepeated tasks, and includes the necessary unchanged controls. Thus, some Ss had 16-item Unrepeated lists in both halves of the Experiment, some had 8-item Unrepeated lists in both halves, some had 8- and then 16-item lists and some had 16- and then 8-item lists. The two unchanged control groups may be designated as the 16-16 and 8-8 group, and the two changed, experimental groups may be designated as 16-8 and 8-16.

Predictions concerning the outcome of this experiment were derived from the results of Experiment II and III. Consider the two control groups first. The failure to find a significant trials effect for the Unrepeated conditions of either Experiments II or III leads to the prediction that the preformance of the 16-16 and 8-8 would be comparable in both halves of the experiment. The finding that Internals exceeded Externals in the Unrepeated conditions of both Experiments II and III leads to the prediction that Internals would recall more items than Externals on both halves of the 8-8 and 16-16 conditions. The fact that all Ss recalled more items in the Unrepeated condition of Experiment III, which used 12-item lists, than in the Unrepeated condition of Experiment II, which used 8-item lists (See Figure 1), leads to the prediction that both Internal and External Ss would recall more items in the 16-16 condition than in the 8-8 condition. All of these predictions might be evaluated in a single analysis of variance in which the dimensions are Condition (8-8 and 16-16), Half (First-Second) and LC (Internal-External).

If the predictions are correct, this analysis should yield reliable main effects for Condition and LC, but not for Half nor for any of the interactions. Observing this pattern of results would indicate that the relationship between LC and recall is not offset by simple experience in a learning task.

Predictions for the 16-8 and 8-16 groups were derived from the findings of Experiment III. The relevant findings were that the Internals exceeded the Externals on the Repeated task when it came first, but not when it followed the Unrepeated (See Figure 2). If this pattern of findings reflects a differential reaction of the Internals to the increase in difficulty when going from the Repeated to the Unrepeated condition, then the Internals should be superior to the Externals on the second half of the 8-16 condition (a shift from a relatively easy to a hard task) but not on the second half of the 16-8 condition (a shift from a hard to a relatively easy task). Since the Internals are predicted to be superior to the Externals on the first half of both the 16-8 and 8-16 condition, it is necessary when evaluating this prediction to be certain that any differences on the second half of the task are independent of those observed on the first half.

An appropriate test of this hypothesis could be done by including the first and second half data in a LC (ILC vs ELC) x Condition (16-8 and 8-16) x Half (First-Second) analysis of variance. In such an analysis the predicted effect would manifest itself as a LC x Condition x Half interaction. However, such an interaction could be due in part to differences in amount of material learned on the first part. Consider, an S who had learned many digits, e.g. 7, during the first half of the

experiment. Any increment or decrement that he might show during the second half would thus be at a higher level on a scale of "digits memorized" than that of an S who had only learned an average of 4 digits on the first half. The psychological units of measurement on such a "number of digits memorized scale" may not be equal at low and high ranges of that scale. Thus, it could be argued that an interaction involving halves of the experiment was due in part to unequal scale intervals, since a change in number of items recalled from the first to the second halves of the task might reflect different amounts of improvement or decrement depending upon the level of first half performance. This problem can be overcome by selecting for analysis only Internal and External Ss who are equal in first half performance. This matching would make the predicted interaction clearly interpretable if it proved reliable.

Method

Subjects. The Ss were 128 fifth and sixth grade pupils selected from a population of approximately 200 fifth and sixth graders on the basis of their LC and MA scores. The 200 pupils were divided into ILC and ELC groups by selecting Ss from the extreme ends of the distribution and choosing progressively closer to the middle until 64 Ss had each been selected for the ILC and ELC groups. The only restriction in the process was that the groups have comparable Kuhlmann-Finch MAs. Each personality group was then further divided randomly into four subgroups of 16 each. One sub-group was assigned to the 8-8 condition, one to the 8-16, one to the 16-16 and one to the 16-8. This made 8 subgroups of 16 Ss each in the overall design. The population used in this study was independent of that used in Experiments II and III although it did come from

the same school district.

Procedures. The same type of group administered and tape recorded Unrepeated free recall tasks used in Experiments II and III were employed in this experiment, but the lists contained 16 rather than 12 two-digit numbers. All Ss were tested in classroom-sized groups. The Kuhlmann-Finch Test was administered in one testing session. Approximately one week later the Locus of Control scale was administered. The free recall task was administered about a week after the LC scale.

Results

In order to provide an omnibus test of the predictions advanced above, an LC x Half x First Condition x Second Condition analysis of variance was performed. It was predicted that the analysis of correct responses should result in a reliable 4-way interaction, and it did ($F_{1/120}$ = 5.1, $p$ <.05). There were also reliable main effects for LC ($F_{1/120}$ = 6.1, $p$ <.05), First Condition ($F_{1/120}$ = $p$ < .05) and Second Condition ($F_{1/120}$ = 10.5, $p$ <.01), as well as reliable interactions for First Condition x Half ($F_{1/120}$ = 35.6, $p$ <.001) and Second Condition x Half ($F_{1/120}$ = 44.5, $p$ <.001). In order to determine whether the observed 4-way interaction reflected the apriori predictions, simpler analyses were performed.

The number of correct responses from the 8-8 and 16-16 conditions were subjected to further analyses. The directional predictions that the ILC Ss would recall more than the ELC Ss ($t_{64}$ = 1.81, $p$ < .05), and that recall would be greater in the 16-16 than in the 8-8 condition ($t_{64}$ = 4.08, $p$ <.01) were upheld. The ILC Ss recalled a mean of 4.68 items per trial whereas the ELC Ss recalled a mean 4.06 items per trial. A mean of 3.68 items per trial were recalled in the 8-8 condition and 5.08

items in the 16-16 condition.

LC x Half analyses were calculated separately for the 8-16 and 16-8 conditions. As predicted, a reliable LC x Half interaction ($F_{1/32} = 7.08$, $p < .025$) occurred in the 8-16 condition. This reflected the fact that the ILC Ss recalled more items on the second half than did the ELC Ss. As predicted, no such LC x Half interaction was observed in the 16-8 condition.

In order to be certain that the differences that were observed on the second half performance of the 8-16 and 16-8 conditions were due to neither differences on first half performance nor to unequal scale intervals, ILC Ss and ELC Ss were selected according to their first half performance. This selection yielded 17 ELC Ss and 14 ILC Ss who were equal on their first half performance in the 16-8 condition and 10 ELC Ss and 15 ILC Ss who were equal in first half performance on the 8-16 condition. LC x Half analyses were calculated separately for the 8-16 and 16-8 conditions (See Figure 3) in the foregoing analyses. The Half main effects were reliable for both the 16-8 ($F_{1/29} = 41.03$, $p < .001$) and 8-16 ($F_{1/23} = 73.92$, $p < .001$) analyses. Also as predicted, there was a reliable LC x Half interaction ($F_{1/23} = 5.62$, $p < .05$) in the 8-16 condition which reflected the fact that the ILC Ss performed better than the ELC Ss on the second half. Furthermore, there was no LC x Half interaction in the 16-8 condition, again as predicted. (See Table 2)

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Insert Table 2 about here

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## Summary Discussion

The results of the present four experiments establish clearly that a portion of the between-subjects' variability observed in experiments on children's learning are associated with the LC personality variable. Internals recalled more than Externals both when the task required incidental learning and when it required intentional learning. Despite the fact that the ES and IO[4] variables did not relate reliably to intentional learning, these studies demonstrate the utility of controlling for personality when attempting to reduce error variance in the study of children's learning.

Experiment IV showed that the failure of the Internals to surpass the Externals in the Repeated condition when it followed the Unrepeated condition of Experiment III was not due to the tenuous nature of the LC-learning relationship. Rather, this lack of difference resulted from changing from the more difficult, Unrepeated condition to the less difficult, Repeated condition.

The superiority of Internals over Externals that was observed in the Unrepeated conditions of Experiments II, III and IV indicates that task feed-back does not mediate this superiority. This suggests that the difference between the two types of Ss are not due to differential reactions to task feedback, i.e., to differences in self-reinforcement (See Introduction). The results of the Repeated condition of Experiment III are also consistent with this conclusion. Although the Internals did improve more over trials than the Externals, their differential rate of improvement was no greater than would be expected from their superiority in the Unrepeated condition. The Internals recalled 0.5 items more than the Externals in the Unrepeated condition as well as on the first trial of the Repeated condition of Experiment III. Their rate of improvement

per trial in the Repeated condition was precisely 0.5 items more than the Externals' rate of improvement.

The differential reaction of the Internals and Externals to the change in difficulty in the 8-16 condition of Experiment IV suggests that the basis of the Internals' superiority to the Externals is that they strive harder to succeed in learning situations. That is, Internals respond with greater effort to tasks which contain a challenge. This interpretation is consistent with the findings of Miller (1961) and Butterfield (1965) in other experimental settings. In the present experiments, the increased difficulty of the Unrepeated over the Repeated and the 16-item over the 8-item tasks was viewed as a greater challenge and met with greater effort by the Internals than by the Externals. Also, changing to a much easier task apparently reduces the motivation of the ILCs to the point that their usual superiority to ELCs vanishes.

There are several possibile reasons for the failure of the ES variable to predict. We hypothesized that a self-evaluating child would "receive" more evaluations than a child who relies on evaluations from others. It does seem likely he would get more reinforcements, but there is no logical reason for saying he will receive more positive evaluations (or reinforcements). We had assumed in our hypothesis derivation that more evaluations equaled more positive evaluations and of this we have no evidence. A child could rely upon his own evaluations rather than upon those of others, but be markedly self-critical rather than positively self-evaluating. An example of such an orientation to the world is seen in depressives. If some children were generally positive in their self evaluations, whereas others were generally negative, then ES would be unpredictive, on the average, of learning.

The relevance of this research to general areas of children's learning seems clear. Free recall learning is one of the most common educational

procedures and any variable which exerts a significant and continuing influence upon a child's performance in this area should be examined and taken into account in the educative process. In this case the implications are that the child who believes that he is responsible for the things that happen to him in this world will exert more effort on tasks and will learn more in a given attempt than will the child who eschews personal responsibility and prefers to ascribe the occurrence of good or bad events in his life to chance, fate or the ill will of powerful others. Parents and teachers should encourage their charges to see themselves as exerting a meaningful influence upon their world and as capable of making change that will affect them personally. One cannot help speculating how large a role a feeling of powerlessness plays in the failure of the ghetto child to benefit from the education he is offered. If it is a marked attitude, and if it continues to operate over many years in virtually all aspects of a child's learning, the cumulative effect could be enormous. This of course points toward questions that now leap to mind. Is an external Locus of Control more prevalent in lower socioeconomic children? Does it extinguish with maturity? Katkovsky, Crandall and Good (1967) have already linked the development of feelings of responsibility for the reinforcements one obtains with parental behaviors characterized as warm, praising, protective and supportive. Investigations into the modifiability of such sets toward aspects of the world seem pertinent. Also the generalizability of the influence of this personality trait to many different categories of learning should be ascertained. For example, one concrete suggestion would be to attempt to show the influence of LC upon some more naturalistic learning such as achievement in school.

## Footnotes

1. The research reported here was supported by the University of Kansas Biomedical Sciences Support grant and by the following research grants from the United States Public Health Service and the United States Office of Education: HD-00183, HD-00870 and OEG-6-9-008126-0050 (057). Kansas School District 110 provided the elementary school children who served as subjects and the authors are grateful to Drs. Diggs and Farmer as well as to the principals and staffs of the schools involved. Carlotta Young, Carman Hanna, Donna Gribble and Bea Gundle assisted in the data collection and data analysis. Mrs. Delece Hendricks typed the manuscript.

2. Previous investigators (e.g., Raskin, 1949; Miller, 1963) have used the designation Locus of Evaluation to refer to the personality dimension which we have called Evaluative Style. We have chosen the label Evaluative Style because it appears to be more descriptive and because it reduces confusion with the Locus of Control variable.

3. Although recall of completed and incompleted tasks have been regarded as indices of memory (e.g., Rosenzweig, 1938; Zeller, 1952), findings by Caron and Wallach (1959) support the present assumption by clearly indicating that differences in recall reflect differences in learning at the time of task presentation rather than differences in memory for the task. There are also several logical arguments against the use of such recall measures to reflect memory rather than learning processes (Butterfield, 1964; Belmont & Butterfield, in press).

4. Another personality variable, Incentive Orientation (IO), was also incorporated into the design of Experiments II and III. Incentive Orientation refers to the extent that children prefer intrinsic incentives

such as learning something new or making something beautiful in contrast extrinsic rewards such as money or comfort. This Intrinsic-Extrinsic concept is similar to that proposed by Haywood (1968a, 1968b)in his studies on motivational orientations in children and both are derived from the motivation-hygiene trait psychology theory of Herzberg and Hamlin (1961, 1963).

Haywood & Weaver (1967) have shown that Intrinsically Incentive Oriented (IIO) children learn faster than Extrinsically Incentive Oriented (EIO) children when the major incentives in a task are intrinsic, and vice versa when they are extrinsic. In the Repeated condition of free recall learning in Experiment II, there was an opportunity following every trial for the Ss to determine the number of correct responses they had made on the previous trial. No such opportunity presented itself in the Unrepeated condition. Assuming that information about correctness is an intrinsic incentive, it was predicted that IIO Ss would learn more than EIO Ss in the Repeated condition but not in the Unrepeated condition. Ss were selected to represent IIO and EIO, as well as the ELC-ILC and SES-OES, and all analyses in Experiments II and III incorporated this variable. For example, the omnibus analysis of variance presented for Experiment II had the following dimensions: LC(ILC-ELC x ES (SES-OES) x IO (IIO-EIO) x Condition (Repeated-Unrepeated) x Order (First-Second) x Trials (1-8). The IO dimension was collapsed in the presentations shown in this article because the analyses revealed no significant main effects or interactions involving IO. Presentation of the predictions, instruments, procedures and discussions relating to IO were not included in the text in order to shorten this report.

5. This selection was made from the entire population of 200 Ss which explains why the number of Ss in each subgroup is not in every case smaller than the number (16) in the subgroups in the overall analysis.

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Table 1

Number of Completed and Incompleted Puzzles

Recalled by Each of the Four Groups

| | ILC-SES | ILC-OES | ELC-SES | ELC-OES |
|---|---|---|---|---|
| Completed | | | | |
| $\overline{M}$ | 2.79 | 2.29 | 2.21 | 1.79 |
| SD | .42 | .73 | .58 | 1.50 |
| Incompleted | | | | |
| $\overline{M}$ | 1.57 | 1.71 | 2.14 | 1.93 |
| SD | .76 | .73 | .66 | .73 |

Table 2

Number of Items Recalled Correctly Per Trial for Internal and External LC Groups in the 16-8 and 8-16 Conditions

| | 16 - 8 | | 8 - 16 | |
|---|---|---|---|---|
| ILC | | | | |
| $\overline{M}$ | 4.95[a] | 3.87 | 3.25[a] | 5.52 |
| SD | 1.47 | 1.00 | .56 | 1.22 |
| ELC | | | | |
| $\overline{M}$ | 4.95[a] | 3.47 | 3.27[a] | 4.50 |
| SD | 1.19 | .88 | .45 | .79 |

a. groups matched on first half performance.

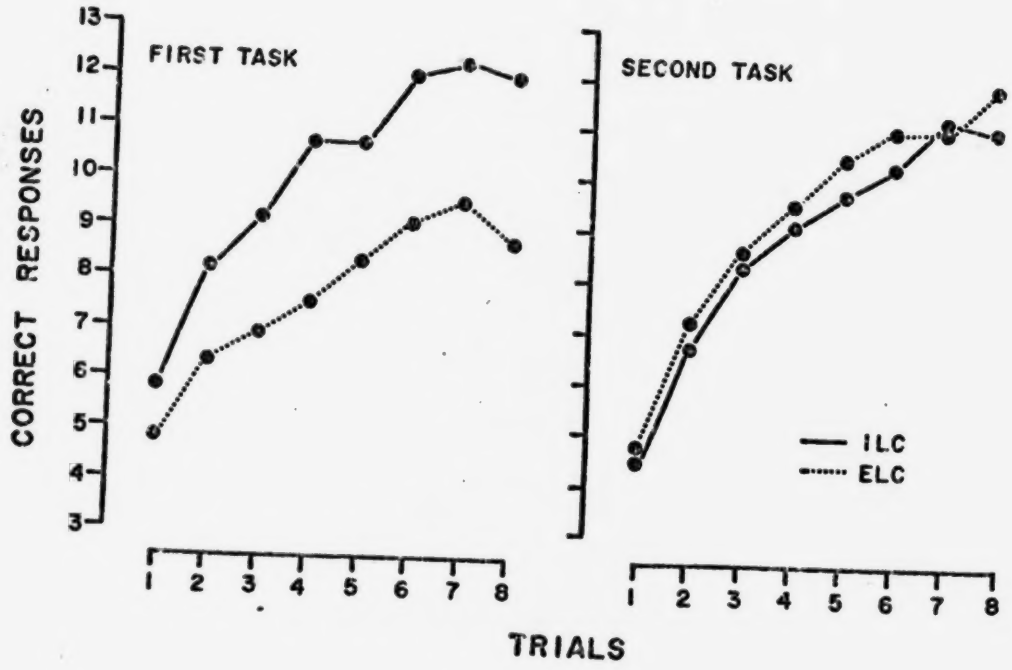


Figure 1

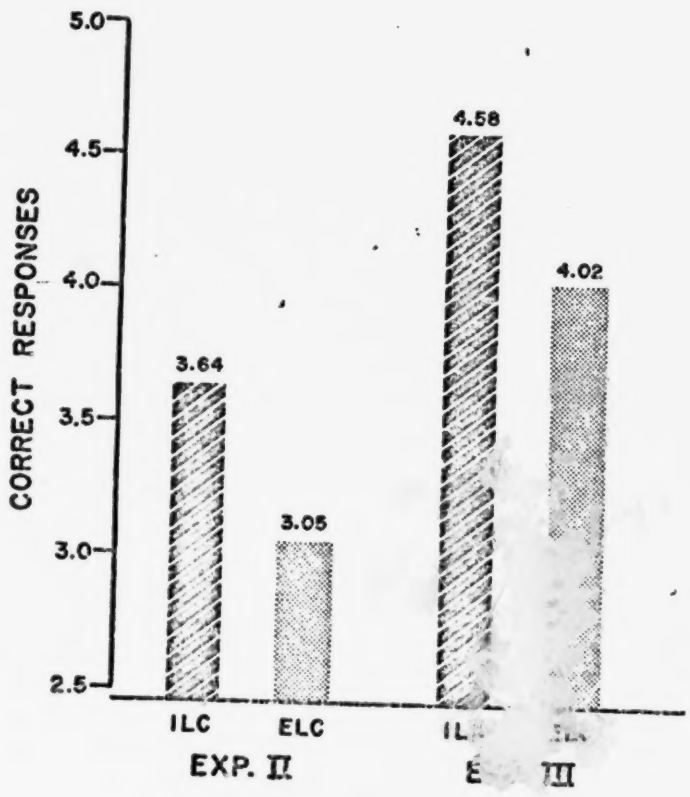


Figure 2